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MATHEMATICS EDUCATION

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K-8 Scope and Sequence
Of Normal Expectancies With
9-12 Sequential Learning Objectives

D1.6/2-2:

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FOREWORD

The general philosophy and framework which establish direction and priorities for mathematics education, kindergarten through grade 12, within the Department of Defense Dependents Schools (DoDDS) are listed within. The K-8 scope and sequence of normal expectancies highlight more specific grade level objectives while the 9-12 sequential learning objectives portray the secondary curriculum. Both documents were developed as part of the Seven-Year Curriculum Development Plan for DoDDS. Each document will be reviewed and revised periodically in order to assure its relevance to the DoDDS educational philosophy.

Steve Motta
Deputy Director

INTRODUCTION

The overall goals of the DoDDS mathematics program for students are to:

1. Develop or increase their mathematics knowledge.
2. Utilize their mathematics knowledge for problem solving.
3. Create or maintain a positive attitude toward mathematics.

Whenever possible, these goals should be achieved through the use of interdisciplinary instruction. The K-12 DoDDS mathematics curriculum reflects agreement with the statements of the National Council of Teachers of Mathematics (NCTM) which states in its *Agenda for Action*, "Problem solving should be the focus of school mathematics for the decade of the 80's" and "mathematics must take full advantage of the power of calculators and computers at all grade levels."

The importance of life skills must be continually emphasized with a genuine concern for the humane teaching and treatment of all students. Understanding the process through which the solution is determined is often more important than the answer itself. Diverse instructional strategies, materials, resources, and modern technology should be used at all levels, especially:

1. Hand-held calculators and computers,
2. Manipulatives to illustrate or develop a concept or skill,
3. Individual, large group, or cooperative learning,
4. Materials, references, and personnel from outside the classroom,
5. Opportunities for application of acquired skills, and
6. Learning environments such as laboratories or centers which provide for discovery and inquiry as well as drill.

It should be clearly understood that everyone shares in the responsibility for student achievement. The specific roles in this responsibility are as follows:

1. **Students** are responsible for actively participating in the learning process and maintaining communication with the teacher and their peers.
2. **Teachers** are responsible for providing effective classroom instruction, in addition to maintaining communication with the students and their parents.
3. **Administrators** are responsible for supporting teachers in providing the needed instruction and for ensuring that sufficient resources for successful teaching are available in each school.
4. **Parents** are responsible for maintaining communication with the teacher and providing support for their children to better learn mathematics.

Problem Solving

The individual strands which establish direction and priority within the broad areas of **problem solving** and **attitude development** are:

1. **Thinking Skills:** Thinking skills involve the process of relating problem solving and mathematical concepts to relevant situations through critical thinking and situational analysis.
2. **Number Awareness:** The basic foundation of mathematics is the process of identifying the uniqueness of each number, its meaning, and its relationship to other numbers.
3. **Estimation/Mental Math:** Estimation should focus on a reasonable answer on a regular basis, and mental math should aid in validating the reasonableness of that estimate.
4. **Computational Skills:** The role of computational skills is the proper utilization of number awareness, combined with other basic skill areas to provide fundamental mathematical abilities.
5. **Measurement:** The ability to accurately measure length, area, capacity, temperature, money, and time in standard units is essential.
6. **Geometry:** Geometry introduces the student to spatial relationships, builds a technical vocabulary, and develops an appreciation for the aesthetic geometric beauty throughout the world.
7. **Data Comprehension:** Analysis of information requires the ability to process data, display it in meaningful ways, apply the results, and predict future outcomes.

Care should be given to present mathematics as a study of the interrelationships among the strands rather than the sequential study of the content of each strand separately.

Positive Attitude

KINDERGARTEN

All Objective Statements Should Be Preceded by:
The Student Should Be Able to:

THINKING SKILLS

1. Organize pictures to demonstrate a sequence of events.
2. Manipulate objects to solve oral problems using numbers.

NUMBER AWARENESS

1. Use manipulatives to demonstrate one-to-one relationships by matching sets.
2. Identify corresponding sets with numerals 0 through 10.
3. Count to 20 or greater.
4. Identify, trace numerals 0 through 20.
5. Compare quantities greater than, less than, equal to using one-to-one relationships.
6. Identify objects in sequence next, before after, using first and last.
7. Identify parts of a region whole and one-half.

ESTIMATION/MENTAL MATH

1. Recognize and repeat a pattern and sequence of manipulatives.
2. Use manipulatives to compare quantity terms that include many, some, few, all, none, as many as.

COMPUTATIONAL SKILLS

1. Recognize numerals 0 through 10.
2. Manipulate objects to demonstrate one more, one less, and equal.

MEASUREMENT

1. Recognize penny, nickel, and dime.
2. Describe terms of time: today, yesterday, tomorrow.
3. Describe terms of length: long, short.
4. Describe terms of weight: heavy, light.
5. Describe terms of volume: which container has more or less.

KINDERGARTEN (Continued)

GEOMETRY

1. Identify geometric shapes (circle, square, triangle, rectangle, and oval).
2. Trace or draw geometric shapes (circle, square, triangle, rectangle, and oval).
3. Recognize geometric shapes in the environment.
4. Identify straight and curved lines.
5. Identify simple space relationships (inside, outside, on, under, over).

DATA COMPREHENSION

1. Sort objects by shape, size, color, and use.
2. Classify objects by common attributes.

KINDERGARTEN TASK GROUP RECOMMENDATIONS DEMONSTRATE MATHEMATICAL READINESS SKILLS

1. Identify geometric shapes: rectangle, square, circle, oval, and triangle.
2. Identify straight and curved lines.
3. Draw a geometric shape.
4. Recognize numerals 0 through 10.
5. Demonstrate one-to-one relationships by matching sets.
6. Match objects with numerals (0-10).
7. Count objects in a set (0-10).
8. Demonstrate "one more," "one less," and "equal" using objects.
9. Complete repeating patterns.
10. Identify and name parts of an objective (whole, one-half).
11. Identify space relationships.
12. Identify objects in sequence using first, last, and next.
13. Develop an understanding of time concepts.
14. Count to 20 or greater.

NOTES

1ST GRADE

All Objective Statements Should Be Preceded by:
The Student Should Be Able to:

THINKING SKILLS

1. Join and separate sets of 10 or fewer objects to solve problems.
2. Describe the sequence of everyday events.
3. Solve oral problems using facts through 10.
4. Tell a story or draw a picture illustrating a given equation using facts through 10.
5. Determine whether addition or subtraction is needed to solve simple story problems.
6. Write and solve equations for given pictured addition or subtraction problems.
7. Complete a sequence of numbers less than 99.

NUMBER AWARENESS

1. Recognize sets to 10.
2. Identify place value with ones and tens.
3. Identify the use of 0 as a place holder.
4. Identify order and write numbers 0 through 100.
5. Understand concept of before, after, and in between from 0 through 100.
6. Identify 1 more and 1 less of a given number from 1 through 100.
7. Write any numerals 0 through 100 from dictation.
8. Recognize and use ordinal numbers first through tenth.
9. Count 0 through 100 by ones, fives, and tens.
10. Read, write, and use symbols =, +, and −.
11. Recognize one-fourth of a region.
12. Read the symbols ½ and ¼.

ESTIMATION/MENTAL MATH

1. Estimate whether a group of objectives is less than or greater than 18.
2. Estimate the age of peers/adults.
3. Reproduce from memory a given pattern with no more than four items.
4. Complete a sequence of numbers less than 100.

1ST GRADE (Continued)

COMPUTATIONAL SKILLS

1. Use symbols +, −, and = to perform simple computation.
2. Add and subtract numbers 0 through 10 using the number line and other manipulative aids.
3. Compute addition and subtraction facts through 10 using horizontal and vertical notation.
4. Illustrate numbers as a collection of tens and ones for numbers 10 through 100.
5. Combine three addends with horizontal and vertical notation.
6. Demonstrate the commutative property of addition using manipulatives.

MEASUREMENT

1. Compare and arrange objects by size and/or weight.
2. Recognize hour and half hour on the clock.
3. Use available standard or non-standard measurement units to determine length and weight.
4. Name the value of penny, nickel, and dime in terms of cents.
5. Use a calendar.

GEOMETRY

1. Recognize open and closed curves.
2. Locate points that are inside, outside, and/or on geometric shapes.
3. Identify and draw geometric shapes: circle, square, triangle, rectangle, oval, and diamond.
4. Complete the other half of a basic shape.

DATA COMPREHENSION

1. Observe, record, and graph information with teacher help.
2. Make a picture graph from collected data.
3. Read simple bar and picture graphs.

NOTES

2ND GRADE

All Objective Statements Should Be Preceded by:
The Student Should Be Able to:

THINKING SKILLS

1. Solve word problems using facts through 18.
2. Establish an order of steps for problem solving such as: define the problem, formulate a plan, act on the plan, and evaluate the outcome.
3. Write an equation to solve a simple word problem.
4. Find the missing addend in a number equation.
5. Solve word problems in addition and subtraction using 2-digit numbers.
6. Purchase items for 25 cents or less which involves making change with pennies, nickels, and dimes.
7. Complete a sequence of numbers less than 1,000.

NUMBER AWARENESS

1. Recognize odd and even numbers through 100.
2. Demonstrate use of the number line from 0 through 100.
3. Count by twos through 100.
4. Understand place value to 1,000.
5. Count, read, and write numbers 0 through 1,000.
6. Read and write expanded notation from 0 through 1,000.
7. Express cardinal numbers as ordinal numbers to 20.
8. Compare numbers to 1,000 to determine equality or inequality.
9. Recognize, read, and write $\frac{1}{3}$.

ESTIMATION/MENTAL MATH

1. Select from three choices a reasonable estimate of an addition or subtraction problem.
2. Estimate the time it takes to do a certain task to the nearest hour or half hour.
3. Estimate the length of line segments.
4. Round a 2-digit number to the nearest 10.

2ND GRADE (Continued)

COMPUTATIONAL SKILLS

1. Compute addition and subtraction facts through 18 using horizontal and vertical notation.
2. Add and subtract 2-digit numbers to include regrouping.
3. Add and subtract 3-digit numbers without regrouping.
4. Check addition and subtraction for accuracy.
5. Complete number sentences.
6. Demonstrate that addition and subtraction are opposite operations.

MEASUREMENT

1. Make change from $.25 with pennies, nickels, and dimes.
2. Measure the length of a given object to the nearest centimeter and inch.
3. Use standard and non-standard measurement units to determine weight and temperature.
4. Tell time in intervals of 5 minutes.
5. Use written notation for indicating time.
6. Read and write the symbol ¢ and $.

GEOMETRY

1. Draw open and closed curves.
2. Classify plane geometric figures by shape, size, and color.
3. Find geometric shapes in pictures.
4. Recognize cubes, cones, and spheres.
5. Determine the line of symmetry for basic geometric shapes.

DATA COMPREHENSION

1. Draw simple bar and picture graphs from given data.
2. Interpret information shown in bar and picture graphs.
3. Record outcomes from simple observations, and graph the data.

NOTES

3RD GRADE

All Objective Statements Should Be Preceded by:
The Student Should Be Able to:

THINKING SKILLS

1. Categorize objects according to their common attributes.
2. Identify unnecessary information in a word problem.
3. Solve word problems using diagrams and pictures.
4. Solve word problems by making an organized list.
5. Translate words into mathematical symbols.
6. Formulate word problems using appropriate computational skills.
7. Guess and check answer to a word problem.
8. Solve word problems in addition and subtraction through 3-digit numbers.
9. Organize sets to solve oral and written problems in multiplication and division, through 6.
10. Complete a sequence in which there is a pattern of addition or subtraction.
11. Apply simple flow-charting techniques to solve one-operation problems.

NUMBER AWARENESS

1. Identify place value to 10,000.
2. Read and write compact and expanded notation of numbers of 10,000.
3. Read and write numbers to 10,000.
4. Recognize, read, and write 1/4, 1/5, 1/6, 1/7, 1/8.
5. Recognize, read, and write 2/2, 2/3, 2/4, 3/4, 4/4.
6. Demonstrate the property of oneness in multiplication.
7. Demonstrate the property of zero in multiplication.
8. Read and write Roman numerals to XII.
9. Compare numbers to 10,000 to determine equality or inequality.

ESTIMATION/MENTAL MATH

1. Round whole numbers to nearest 100.
2. Estimate sums and differences of 3-digit numbers to the nearest hundred.
3. Estimate the cost of 2 items less than $1 in value.
4. Estimate the height of certain objects in nature.
5. Select a reasonable estimate with simple problems involving distance and time.
6. Complete a sequence of odd numbers or even numbers.

3RD GRADE (Continued)

COMPUTATIONAL SKILLS

1. Add and subtract 3-digit numbers with regrouping.
2. Compute multiplication facts 0 to 6 through 6×9.
3. Add and subtract 4-digit numbers without regrouping.
4. Use manipulatives to show division concepts.
5. Compute related division facts through 6×9.
6. Align a horizontal set of single and multiple digit numbers into a vertical formation for addition or subtraction.
7. Demonstrate the relationship between multiplication and division.

MEASUREMENT

1. Recognize the value of local currency.
2. Use standard measurement units to measure temperature, length, weight, and volume.
3. Tell time using face and digital clocks and watches.
4. Make change from $1.
5. State the value of various U.S. coins and bills.

GEOMETRY

1. Name cubes, cones, spheres, cylinders, and pyramids.
2. Identify a parallelogram.
3. Identify angles which are right angles.
4. Use a straightedge and pencil to draw basic figures.
5. Recognize common geometric forms in the natural and technical world.
6. Use manipulatives to show the perimeter and area of squares and rectangles.

DATA COMPREHENSION

1. Read and interpret line graphs.
2. Draw bar and line graphs from given data.
3. Select a subject and collect, tabulate, and graph data.
4. Use a tally system as a means of recording.

4TH GRADE

All Objective Statements Should Be Preceded by:
The Student Should Be Able to:

THINKING SKILLS

1. Formulate word problems involving appropriate computational skills.
2. Identify missing information in a word problem.
3. Solve word problems by dividing into smaller problems.
4. Solve simple 2-step word problems involving the four operations.
5. Solve word problems involving addition and subtraction of decimals to hundredths.
6. Solve word problems in addition and subtraction using numbers beyond 3 digits.
7. Solve simple word problems using multiplication and division.
8. Use appropriate labels for answers to word problems.
9. Complete a sequence in which there is a pattern of repeated multiplication or division.
10. Apply simple flow-charting techniques to solve 2-operation problems.

NUMBER AWARENESS

1. Understand place value to 100,000.
2. Read and write compact and expanded notation to 10,000.
3. Identify single digit factors of numbers to 100.
4. Identify numerators and denominators.
5. Read and write decimals through hundredths.
6. Read and write fractional numbers greater than 1.
7. Recognize equivalent fractions.

ESTIMATION/MENTAL MATH

1. Round whole numbers to nearest thousand.
2. Estimate the weight of certain objects.
3. Estimate an answer to a 2 and 3-digit addition problem to nearest 10's and 100's.
4. Estimate products of 2-digit factors.
5. Check reasonableness of computations by comparison with estimates.
6. Estimate the amount of money needed to purchase several items.
7. Estimate the time to walk a certain distance.
8. Make estimates of objects in the student's environment in terms of size and number.
9. Estimate perimeters involving whole numbers.

4TH GRADE (Continued)

COMPUTATIONAL SKILLS

1. Add and subtract 4-digit numbers with regrouping.
2. Find sums and differences using dollar and cent notation.
3. Compute basic multiplication facts through 9.
4. Multiply by 1 and 2-digit numbers with regrouping.
5. Compute division facts 1 through 9.
6. Divide by 1 digit with or without remainder.
7. Compute average of up to 9 items.
8. Add and subtract decimals to hundredths.

MEASUREMENT

1. Differentiate between A.M. and P.M.
2. Compare digital time to standard clock time.
3. Tell time to nearest minute.
4. Identify relationships between units of measure (length, weight, volume, time, money).
5. Measure the sides of polygons using standard units to find perimeter and area.
6. Read the Celsius and Farenheit thermometers.
7. Make change in local or U.S. currency to $5.

GEOMETRY

1. Identify the radius, diameter, and circumference of a circle.
2. Identify points, line segments, parallel lines, acute and obtuse angles.
3. Identify and count faces, entries, and edges of prisms.
4. Use manipulatives to show the area of a triangle.
5. Identify the similarities and differences between 2 and 3-dimensional figures.
6. Use coordinates to describe locations on graphs and maps.
7. Identify a right triangle.

DATA COMPREHENSION

1. Interpret pictographs and use information to solve problems.
2. Interpret bar, line, and circle graphs.
3. Draw bar and line graphs from given data.
4. Identify possible outcomes of an event.

5TH GRADE

All Objective Statements Should Be Preceded by:
The Student Should Be Able to:

THINKING SKILLS

1. Solve word problems involving the four basic operations with whole numbers.
2. Solve word problems involving decimals to hundredths.
3. Solve a problem by comparing it to similar solved problems.
4. Work backwards to solve a problem.
5. Formulate word problems without enough information to solve them.
6. Complete a sequence of whole numbers in which there is a combination of addition and subtraction patterns.

NUMBER AWARENESS

1. Understand place value to 1,000,000.
2. Read and write compact and expanded notation to 100,000.
3. Identify factors of numbers.
4. Identify the common factors of a pair of numbers.
5. Identify the greatest common factor of a pair of numbers.
6. Identify multiples of a number.
7. Identify the common multiples of a pair of numbers.
8. Identify the least common multiple of a pair of numbers.
9. Rename improper fractions as mixed numbers.
10. Rename mixed numbers as improper fractions.
11. Compare written fractions using symbols.
12. Identify prime and composite numbers.
13. Determine the prime factorization of numbers.
14. Read, write, and compare decimals to thousandths.
15. Recognize common fractions as decimal numbers.

ESTIMATION/MENTAL MATH

1. Use estimation in performing the division algorithm with a 2-digit number.
2. Round whole numbers to the nearest million.
3. Use divisibility rules for 2, 5, and 10.
4. Estimate the distance traveled in a certain time.
5. Estimate products of 2 and 3-digit factors.
6. Estimate the sums and differences of fractional and decimal numbers.
7. Estimate areas involving whole numbers.

5TH GRADE (Continued)

COMPUTATIONAL SKILLS

1. Multiply by three digits with regrouping.
2. Divide by two digits with or without remainders.
3. Add and subtract decimals to thousandths.
4. Multiply decimals whose product has no more than 4 decimal places.
5. Divide decimals by whole number.
6. Find the greatest common factor of a pair of numbers.
7. Find the least common multiple of a pair of numbers.
8. Reduce fractions to lowest terms.
9. Change common fractions to equivalent fractions.
10. Change mixed numbers to improper fractions.
11. Change improper fractions to mixed numbers.
12. Add and subtract common fractions with like denominators.
13. Find the missing term in equivalent fractions.

MEASUREMENT

1. Identify and apply appropriate units of measure of time, temperature, length, weight, and volume.
2. Compare Celsius and Fahrenheit equivalent temperatures.
3. Use and compare numerical date notation.
4. Interpret scale drawings.
5. Tell time using seconds.
6. Compare different time zones.
7. Make change from $20.
8. Measure angles 0 to 180 degrees with a protractor.
9. Measure the area of plane figures with a grid.

GEOMETRY

1. Identify and name polygons having 4, 5, 6, and 8 sides.
2. Identify congruent and similar polygons.
3. Identify the area of a circle.
4. Recognize and draw intersecting and perpendicular lines.
5. Identify and count faces, vertices, and edges of polyhedrons.
6. Graph ordered pairs in the first quadrant of the coordinate plane.

DATA COMPREHENSION

1. Interpret a circle, bar, line, and pictograph.
2. Compute averages from collected data.

6TH GRADE

All Objective Statements Should Be Preceded by:
The Student Should Be Able to:

THINKING SKILLS

1. Formulate word problems containing extraneous information.
2. Solve multistep word problems using a logical process.
3. Solve simple logical problems.
4. Formulate word problems related to everyday situations.
5. Apply computational skills in comparative shopping.
6. Use measurement and map skills to determine dimensions in the environment.
7. Determine the number of geometric figures in a drawing.
8. Complete a sequence of whole numbers in which there is a combination of operations.

NUMBER AWARENESS

1. Read and write compact and expanded notation to billions.
2. Identify reciprocals of fractions, whole numbers, and mixed numbers.
3. Read, write, and compare decimals through ten thousandths.
4. Compare mixed numbers or mixed decimals using symbols.
5. Read and write Roman numerals including L, C, D, and M.

ESTIMATION/MENTAL MATH

1. Round decimals to nearest whole numbers.
2. Estimate product and quotient of fractional and decimal numbers.
3. Use divisibility rules for 3, 6, and 9.
4. Estimate averages.
5. Estimate money spent in everyday living.
6. Use the clustering method to add a column of numbers.
7. Estimate temperature in the environment.

COMPUTATIONAL SKILLS

1. Perform the four basic operations with decimals and whole numbers.
2. Add and subtract fractions and mixed numbers with like and unlike denominators.
3. Multiply and divide fractions and mixed numbers.

6TH GRADE (Continued)

MEASUREMENT

1. Demonstrate knowledge of metric prefixes from milli to kilo through conversions.
2. Draw angles between 0 and 180 degrees using a protractor.
3. Define and apply precision in measurement.
4. Translate 24-hour clock into A.M. and P.M. and vice versa.
5. Use a scale in map reading.

GEOMETRY

1. Use a compass and straightedge to construct acute, obtuse, right, and straight angles.
2. Identify and name scalene, isosceles, equilateral, acute, obtuse, right, and straight angles.
3. Calculate the radius or diameter of a circle when one or the other is given.
4. Find the area of a triangle, parallelogram, trapezoid, and circle using formulas.
5. Graph ordered pairs in the four quadrants of the coordinate plane.

DATA COMPREHENSION

1. Interpret charts and tables to make inferences.
2. Research and select relevant information for display.
3. Illustrate information on a graph.
4. Find the mean of collected data.

NOTES

7TH GRADE

All Objective Statements Should Be Preceded by:
The Student Should Be Able to:

THINKING SKILLS

1. Solve word problems with information displayed in tables, graphs, and charts.
2. Solve word problems involving percents.
3. Formulate word problems involving multistep operations.
4. Arrange numbers in a grid according to a rule.
5. Find the formula for elements in a pattern of numbers.
6. Solve simple problems by writing an appropriate computer program.

NUMBER AWARENESS

1. Identify positive and negative numbers using the number line.
2. Recognize proper notation for repeating decimals.
3. Recognize relationships among fractions, decimals, and percents.
4. Read and write numbers using exponential notation.
5. Recognize associative, commutative, and distributive properties.
6. Demonstrate an understanding of percents.
7. Compare ancient number systems to our present system.

ESTIMATION/MENTAL MATH

1. Estimate the sum, difference, product, and quotient of positive rational numbers.
2. Estimate the measure of an angle in degrees from 0 to 180 degrees.
3. Estimate the cost of materials needed to enclose or cover a certain area.
4. Estimate the sale price of an item when given the original price and percent discount.
5. Use divisibility rules for 4 and 8.
6. Use the front-end methods for estimating the price of multiple purchase.
7. Approximate the weight of an object of large and small magnitude.
8. Estimate the time an event will occur.

7TH GRADE (Continued)

COMPUTATIONAL SKILLS

1. Perform the four basic operations with whole numbers, decimals, and fractions.
2. Multiply and divide by powers of 10 by relocation of decimal point.
3. Use order of operations to compute.
4. Convert decimals to fractions and percents.
5. Convert fractions to decimal and percents.
6. Convert percents to fractions and decimals.
7. Find a percent of a number.

MEASUREMENT

1. Make or draw a model to scale.
2. Use protractors to bisect angles.

GEOMETRY

1. Recognize plane and half plane.
2. Using a compass and straightedge, construct congruent line segments, congruent angles, and angle and segment bisectors.
3. Identify parallel, intersecting, and perpendicular planes.
4. Identify corresponding parts of congruent or similar figures.
5. Identify pairs of angles having special relationships: supplementary, complementary, vertical, and adjacent.

DATA COMPREHENSION

1. Interpret and make inferences from graphical data.
2. Calculate distances on a map using a scale.
3. Interpret statistics in sports, weather, and other related situations.
4. Identify mean, mode, median, and range to describe data.
5. Compile a frequency table.
6. Perform probability experiments using cards, dice, or spinners.
7. Predict future outcomes from probability experiments.
8. Select an appropriate graph to display information.

8TH GRADE

All Objective Statements Should Be Preceded by:
The Student Should Be Able to:

THINKING SKILLS

1. Solve multistep word problems using the four basic operations with whole numbers, decimals, and fractions.
2. Solve word problems having consumer and career applications.
3. Solve word problems involving proportions.
4. Solve word problems using the Pythagorean Theorem.
5. Use divergent thinking to solve non-routine problems.
6. Solve logic problems.
7. Formulate problems using open-ended answers or no known answers.

NUMBER AWARENESS

1. Recognize the set of real numbers.
2. Demonstrate an understanding of ratio and proportion.
3. Express numbers using scientific notation.
4. Illustrate the commutative, associative, and distributive properties of real numbers.
5. Express the absolute value of a number.
6. Compare number bases other than base 10 to those of base 10.

ESTIMATION/MENTAL MATH

1. Estimate the sum, difference, product, and quotient of rational numbers.
2. Estimate the original price of an item when given the sales-price and percent of discount.
3. Approximate a percentage of a number.
4. Estimate the square root of a number.
5. Use compatible numbers to approximate answers.
6. Estimate relationships between distance, rate, and time.
7. Estimate the probability of an event.

8TH GRADE (Continued)

COMPUTATIONAL SKILLS

1. Perform the four basic operations with rational numbers.
2. Change repeating decimals to fractions.
3. Solve proportions.
4. Find what percent one number is of another.
5. Find a number when a percent of it is given.
6. Rewrite expressions using exponents.
7. Use the Pythagorean Theorem.
8. Solve simple equations.

MEASUREMENT

1. Demonstrate proper use of a variety of measuring instruments.
2. Recognize that there is an inherent error in measuring instruments.
3. Identify significant digits in measuring and computing.
4. Identify greatest possible error in measuring.

GEOMETRY

1. State and use the Pythagorean Theorem.
2. Find the surface area of cylinders, spheres, and rectangular prisms using formulas.
3. Identify and use right triangle ratios (sine, cosine, tangent).
4. Construct perpendicular bisectors and parallel lines.
5. Determine the length of the missing side for one of a pair of congruent or similar polygons.
6. Determine the sum of the interior angles of any polygon.
7. Determine the measures of the interior angles of any regular polygon.
8. Identify the relationships among the angles formed when parallel lines are cut by a transversal.

DATA COMPREHENSION

1. Analyze information of mean, median, or mode to predict possible outcomes.
2. Determine the probability of a pair of independent or dependent events.
3. Use a table of outcomes from a sample space to predict the probability of future outcomes.
4. Survey a local population to collect, organize, display, interpret, and apply the data for future outcomes.
5. Conduct a probability study with independent and dependent events.
6. Determine the number of simple combinations and permutations of the members of a given set less than or equal to five.

GRADE 9-12

All Objective Statements Should Be Preceded by:
The Student Should Be Able to:

PRACTICAL MATH

1. Solve problems involving addition, subtraction, multiplication, and division of whole numbers, decimals, and fractions.
2. Find the perimeter and the area of plane geometric figures and volumes of solid geometric figures.
3. Solve problems using ratio, proportion, and similarity.
4. Find the mode, median, and mean of a set of statistics.
5. Construct and read bar, line, and circle graphs.
6. Compute earnings, take home pay, deductions, and simple taxes.
7. Calculate simple and compound interest.
8. Demonstrate skills in maintaining a simulated personal checking or savings account.
9. Solve problems involving percent.

NOTES

GRADES 8-12

All Objective Statements Should Be Preceded by:
The Student Should Be Able to:

ALGEBRA I

1. Simplify and evaluate numerical and algebraic expressions using order of operations.
2. Solve equations using inverse operations.
3. Translate integer, angle, motion, mixture, and age word problems into equations and solve them.
4. Graph ordered pairs of numbers, and state the coordinates of points in a coordinate plane.
5. Graph two variable linear equations in a coordinate plane.
6. Find an equation of a line given the coordinates of two points on the line.
7. Determine the solution set of a system of two linear equations in two variables.
8. Use two variables to solve certain word problems.
9. Simplify polynomials using the four arithmetic operations.
10. Solve quadratic equations by factoring and by the quadratic formula.
11. Use quadratic equations to solve word problems.
12. Simplify products and quotients of rational expressions.
13. Simplify radicals and radical expressions.

NOTES

GRADES 9-12

All Objective Statements Should Be Preceded by:
The Student Should Be Able to:

GEOMETRY

1. Use undefined terms of points, line, and plane to define other geometric terms and display these symbolically.
2. Know and apply postulates and theorems about parallelism.
3. Apply congruence postulates to compare triangles, angles, and segments.
4. Use postulates, definitions, and theorems to demonstrate deductive reasoning through proofs.
5. Identify and apply properties of special quadrilaterals: parallelogram, rhombus, square, and rectangle.
6. Use ratio and proportion to apply the properties, postulates, and theorems of similar figures.
7. State and apply properties of general and special right triangles.
8. Apply properties of circles, tangents, arc, chords, angles, and segments.
9. Demonstrate proficiency in geometric constructions.
10. Use the formulas of areas and perimeters of plane figures as well as volumes and surface areas of solids.
11. Use formulas and equations in coordinate geometry.

NOTES

GRADES 10-12

All Objective Statements Should Be Preceded by:
The Student Should Be Able to:

ALGEBRA II

1. Use determinants to solve systems of equations.
2. Translate verbal relationships into equations or a system of equations or inequalities and solve.
3. Use properties of polynomials and laws of exponents in simplifying and operating on rational expressions.
4. Apply properties of arithmetic and geometric sequences and series to practical problem solving.
5. Understand and operate within the complex number system.
6. Use synthetic substitution to solve equations.
7. Use coordinate geometry techniques to graph circles, parabolas, ellipses, and hyperbolas.
8. Solve equations involving or using logarithms.
9. Define, graph, and apply trigonometric functions and verify trigonometric identities.
10. Know and apply fundamental properties of permutations, combinations, and probability.

NOTES

GRADES 11-12

All Objective Statements Should Be Preceded by:
The Student Should Be Able to:

ADVANCED MATH

1. Use mathematical induction to prove statements.
2. Know the value of special trigonometric functions by applying the definition of circular functions.
3. Change degrees to radians and radians to degrees.
4. Solve problems using law of sines and cosines.
5. Prove trigonometric identities and solve equations.
6. Graph and find values of inverse trigonometric functions.
7. Use vectors and polar forms of complex numbers to find solutions to analytic problems.
8. Solve applied problems involving conic sections.

NOTES

GRADES 11-12

All Objective Statements Should Be Preceded by:
The Student Should Be Able to:

CONSUMER MATH

1. Compute gross and net pay from salary, hourly or piece rate wages, or commissions.
2. Maintain and reconcile a checking account and records.
3. Differentiate among types of insurance and their purposes, compute premiums, depreciation, and payments.
4. Compute taxes to include sales, property, state, and federal income tax to include filling out a 1040.
5. Compare credit plans and installment buying by computing finance or other charges.
6. Compute simple and compound interest earned or owed on savings accounts, CD's, loans, and mortgages.
7. Compute the total cost of buying, owning, operating, and maintaining modes of transportation.
8. Compare costs of renting, buying, or building a home.
9. Establish priorities and formulate a personal budget.
10. Ascertain wise expenditures of funds for travel or leisure.
11. Master techniques of comparison shopping and wise consumerism.

NOTES

GRADE 12

All Objective Statements Should Be Preceded by:
The Student Should Be Able to:

CALCULUS

1. Define function and demonstrate a knowledge of function through evaluations and graphs.
2. Use theorems to evaluate limits.
3. Define the slope of a curve and the derivative.
4. Determine the derivatives of algebraic functions to include powers, sums, products, and quotients.
5. Graph functions using maximum, minimum, and inflection points, concavity, asymptotes, and zeros.
6. Solve related rates and maxima minima problems.
7. Apply the Fundamental Theorem of Integral Calculus.
8. Find the derivatives and integrals of trigonometric, inverse, exponential, and logarithmic functions.
9. Use integration in area, length, volume, pressure, mass, moment, centroid, and work problems.
10. Use Taylor series in power expansions of functions.

NOTES

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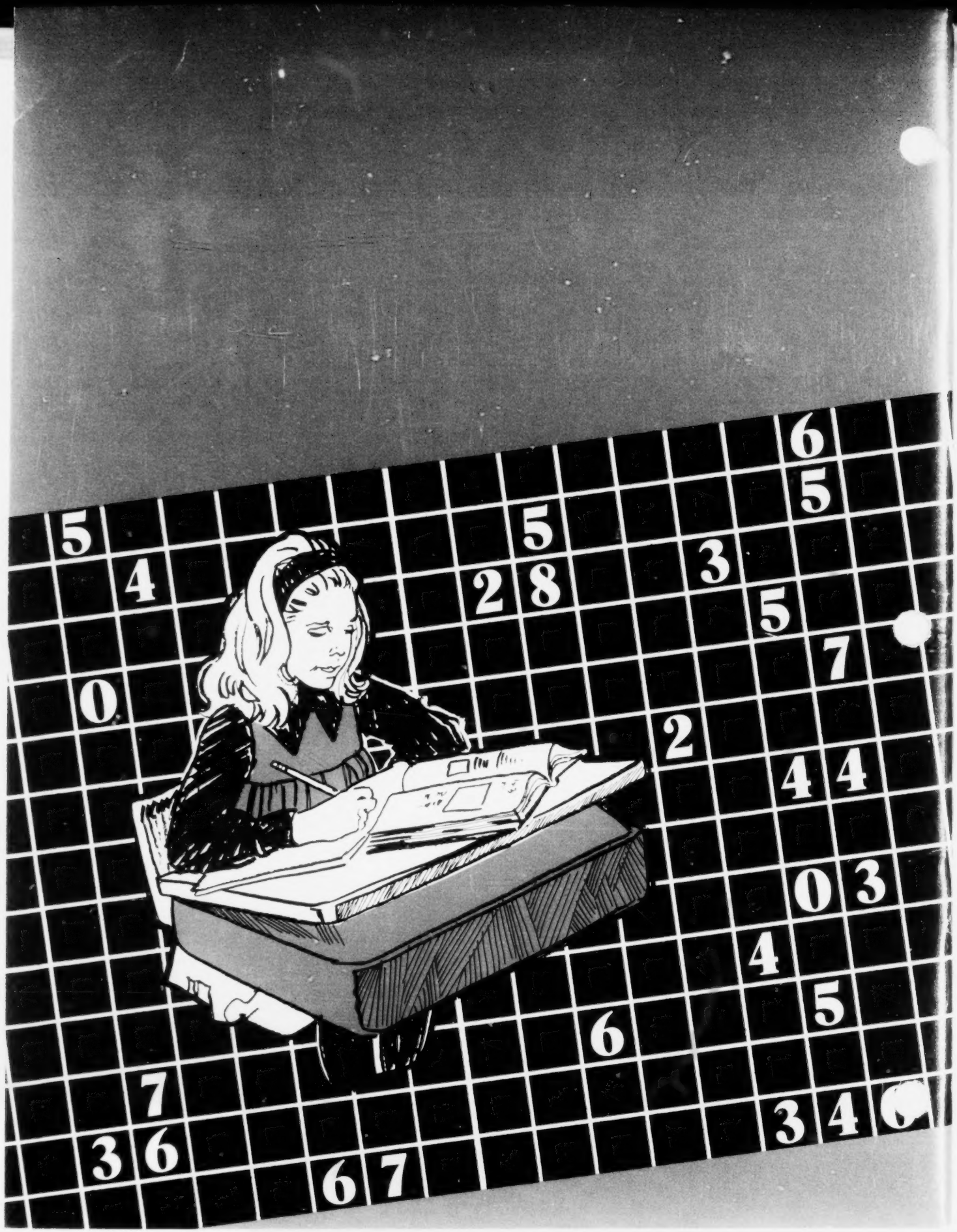
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